Journal of Traumatic Stress, Vol. 17, No. 1, February 2004, pp. 1–9 (© 2004)

Posttraumatic Stress Disorder and Health Status Among Female and Male Medical Patients

Paige Ouimette,[1,6] Ruth Cronkite,[2] Brandy R. Henson,[3] Annabel Prins,[4] Kristian Gima,[5] and Rudolf H. Moos[2]

Posttraumatic stress disorder (PTSD) is associated with objective health problems in specific populations, such as Vietnam veterans. Less is known about PTSD and health among medical samples, especially PTSD patients with different etiologic traumas. This study examined PTSD and health in medical patients within the Department of Veterans Affairs healthcare system. A total of 134 patients completed an interview and questionnaires. Data on physician-diagnosed illnesses were gathered from medical records. PTSD diagnosis and symptoms were associated with a higher likelihood of circulatory and musculoskeletal disorders. In addition, PTSD symptoms were associated with more medical conditions. PTSD symptoms and diagnoses were also associated with poorer health related quality of life. Most of these findings remained significant after controlling for comorbid depressive, generalized anxiety disorder, and panic attack symptoms. Overall, gender did not moderate the relationship between PTSD and poorer health.

KEY WORDS: PTSD; health; gender; health related; quality of life; veterans.

A considerable body of research has sought to understand the relationship between stressful life events and physical health. Less well understood is how severe life events or traumatic stressors (e.g., sexual assault, combat, motor vehicle accidents) and resultant psychological distress affects physical health. Posttraumatic stress disorder (PTSD) has been proposed as a primary causal factor in poorer long-term health, including physician-diagnosed medical illness. Research supports this proposal (for reviews, see Friedman & Schnurr, 1995; Schnurr & Jankowski, 1999), possibly explaining elevated rates of PTSD in medical care settings. For example, an evaluation of a health maintenance organization (HMO) found that 38.6% of patients referred for psychological evaluation from primary care had PTSD (Sampson, Bensen, Beck, Price, & Nimmer, 1999). In a primary care setting, about 12% of patients met criteria for full or partial PTSD (Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000).

PTSD is consistently associated with poorer self-reported health, including medical conditions and health related quality of life (e.g., Schnurr & Jankowski, 1999). In studies utilizing objective measures of health (e.g., physician rated illness), male Vietnam veterans with PTSD have more lifetime and current medical conditions than patients without the disorder (Beckham et al., 1998). In a longitudinal study of male World War II and Korean veterans examining physician-diagnosed disorders, PTSD symptoms were associated with increased onset of cardiovascular, dermatological, lower gastrointestinal, and musculoskeletal conditions (Schnurr, Spiro, & Paris, 2000). Importantly, these relationships emerged after age,

[1]Washington Institute for Mental Illness Research & Training, Washington State University, Spokane, Washington.
[2]Center for Health Care Evaluation, VA Palo Alto Health Care System, Menlo Park, California.
[3]Washington State University, Pullman, Washington.
[4]National Center for PTSD, VA Palo Alto Health Care System, Menlo Park, California.
[5]Environmental Risk Analysis, San Mateo, California.
[6]To whom correspondence should be addressed at 720 E. D. Street, Moscow, Idaho 83843; e-mail: ouimette@wsu.edu.

0894-9867/04/0200-0001/1

smoking, alcohol consumption, and body mass index (BMI) were statistically controlled. Two other studies of male veterans show an association between PTSD and objective measures of cardiovascular problems (Boscarino & Chang, 1999; Shalev, Bleich, & Ursano, 1990). Given that the evidence on PTSD and objective physical health status comes from studies of male combat veterans, there is a need to extend these findings to other populations, including male and female medical patients with PTSD resulting from a broader ranger of etiological traumatic life events.

To our knowledge, no studies to date have examined physician-diagnosed illnesses among women with PTSD. Using self-report measures of physical health, after adjusting for age, education, and health before war-zone exposure, female Vietnam veterans with PTSD reported more health problems, and had more cardiovascular, gastrointestinal, dermatological, gynecological, and ophthalmologic/otolaryngological symptoms than women without PTSD (Wolfe, Schnurr, Brown, & Furey, 1994). In a sample of young men and women from a health maintenance organization, PTSD was associated with more self-reported arthritis, bronchitis, migraine, and more gynecologic complaints among women (Breslau & Davis, 1992).

Health related quality of life, or perceived functional status, is another important aspect of health status. Several studies have examined PTSD and functional status among male and female veterans. Studies of male veterans show that those with PTSD report greater functional impairment including diminished well-being, poorer health reports, and physical limitations (Schnurr, Ford, et al., 2000; Schnurr, Friedman, & Green, 1996; Schnurr & Spiro, 1999; Taft, Stern, King, & King, 1999; Zatzick, Marmer, et al., 1997). In female veterans, those with PTSD have poorer physical functioning (Butterfield, Forneris, Feldman, & Beckham, 2000; Taft et al., 1999; Zatzick, Weiss, et al., 1997). Moreover, several of these studies have examined important aspects of functioning such as depression, age, and health risk behaviors; the relationship between PTSD and physical health impairment remained unchanged.

Similar to studies of veterans, studies of nonveteran primary care and mental health patients show an association between PTSD and functional impairment. In primary care patients, PTSD was associated with disability at work, and with poorer family and social relationships (Stein et al., 2000). In female and male patients from an anxiety disorder clinic, PTSD was significantly associated with poorer physical health functioning. Furthermore, PTSD patients had more impairment than patients with panic disorder, generalized anxiety, and major depression (Zayfert, Dums, Ferguson, & Hegel, 2002).

Given the paucity of research on PTSD and health among women, it is also important to further study the effects of gender. Several lines of evidence suggest that the link between PTSD and health may be stronger among women than men. Women are twice as likely to be diagnosed with PTSD than men (10.4% vs. 5%; Kessler et al., 1995); women have a more severe symptom picture and chronic course than men with the disorder (Breslau et al., 1998). In addition, women report more health problems and are diagnosed more often with health problems than men (Verbrugge, 1985, 1989). On the other hand, women live longer than men (an average of 6 years; Centers for Disease Control and Prevention, 1999). Nonetheless, if differences are found, it will be helpful in providing more targeted assessment and treatment for women and men.

In a review of gender, PTSD and health, Kimerling and colleagues noted that either male or female gender might have health advantage when examining PTSD and health, depending on the methodology employed (Kimerling, Clum, McQuery, & Schnurr, 2002). In a study of Gulf War veterans, gender did not affect the relationship between PTSD and self-reported health symptoms (Wagner, Wolfe, Rotnitsky, Proctor, & Erickson, 2000); similar findings were obtained in a study of young adults in a health maintenance organization (Andreski, Chilcoat, & Breslau, 1998). However, it is possible, the lack of a gender effect may be due to the fitness level of the Gulf veterans and the younger age of the HMO sample.

The present study extended previous work by examining PTSD symptom severity and diagnosis in relation to health status among male and female patients attending general medical clinics in the VA healthcare system. We examined two indices of health status: physician-diagnosed medical illnesses and self-reported physical health related quality of life. We focused on four medical condition categories that contain diagnoses associated with PTSD in previous research (Schnurr, Spiro, et al., 2000): circulatory, musculoskeletal, gastrointestinal, and dermatological conditions. We hypothesized that PTSD diagnosis and symptoms would be associated with the presence of medical conditions and poorer physical health related quality of life. Given the high comorbidity of PTSD with other disorders (e.g., Stein et al., 2000), we examined whether the relationship between PTSD and poorer health remained when other comorbid disorders were taken into account. Given interest in gender issues, we examined gender as a moderator of the association between PTSD and poorer health.

Method

Participants and Procedures

A total of 134 participants from general medical and women's health clinics at the Department of Veterans Affairs Medical Center in Palo Alto and Menlo Park completed this study. Participants were recruited to complete an interview and questionnaire assessing physical and mental health concerns, including reactions to stressful life events.

Graduate students in psychology screened patients for the presence or absence of potential PTSD, using the Primary Care PTSD Screen (Prins et al., 2003), while in the waiting rooms of the clinics. All patients were invited to participate in the screen and all screened and eligible participants were invited into the interview and questionnaire phase of the study. Patients were excluded for cognitive impairment, transportation barriers (participant lived too far away and could not travel to the VA), non-English speaking, invalid phone number, and if participation in another research project precluded their participation in the current study. Of those completing the screen and not meeting exclusion criteria ($N = 237$), 57% ($N = 134$) completed the interview. Average number of days from the initial screen to the interview/questionnaire session was approximately 1 month ($M = 32.14$ days, $SD = 27.86$ days; range 2 days to 5 months). Masters' and doctoral-level psychologists interviewed participants for PTSD and other psychopathology using structured interviews (see ahead). Participants then completed a questionnaire battery. Participants were paid for their participation. Participants who were screened gave their written informed consent to participate in all parts of the study and to allow access to their medical records for the purposes of the study. The Stanford University Panel on Medical Human Subjects approved this project.

Participants, on average, were 51.72 years of age ($SD = 14.98$ years) and had some college or a college degree (68%; $n = 91$). A total of 61% ($n = 82$) were female, 36% ($n = 48$) ethnic minorities, 44% ($n = 59$) were married, and 59% ($n = 79$) were employed. Participants ($N = 134$) did not differ from nonparticipants ($N = 103$) on the total score on the PTSD screening measures. Using patient records, we obtained prior year demographic and clinical information for 88 of the nonparticipants and demographic and diagnostic information for 56 nonparticipants at baseline. Participants did not differ from nonparticipants on age, or the presence of a PTSD, mental health, or medical diagnosis at the index visit. No differences emerged between groups on inpatient hospitalization, number of primary care, PTSD, mental health, or total number of visits during the prior year. A higher proportion of participants than of nonparticipants were women, 61% ($n = 82$) versus 41% ($n = 23$); $\chi^2(1, N = 105) = 6.13$, $p < .05$.

Measures

PTSD

PTSD symptom severity and diagnoses were assessed using the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995). This is a structured clinical interview that assesses *Diagnostic and Statistical Manual of Mental Disorders-IV* (American Psychiatric Association, 1994) PTSD. The CAPS has excellent reliability and validity (see Weathers, Keane, & Davidson, 2001, for a review). PTSD was assessed for the participant's three most severe traumatic life experiences. In the current study, we examined interrater reliability using both in-person and audiotaped reliability ratings ($n = 108$). Interrater reliability for the presence or absence of a current CAPS PTSD diagnosis was excellent, $\kappa = .85$. The intraclass correlation coefficient for the CAPS PTSD symptom severity score was .98.

Other Cormorbid Psychopathology

Past year major depressive disorder, panic disorder, and generalized anxiety disorder (GAD) were assessed using the Composite International Diagnostic Interview—Short Form (CIDI-SF). The CIDI-SF is a screening measure developed from the larger CIDI, which was used in the National Comorbidity Survey (Kessler et al., 1994). The overall classification accuracy of the CIDI-SF compared to the full CIDI ranges from a low of 93% for major depressive episode to a high of over 99% for generalized anxiety disorder. A summary score of symptoms was used for depression (0–3) and panic disorder (0–6); higher scores indicate a greater probability of having the disorder. For depression, symptoms that potentially overlap with PTSD were eliminated from the scale (loss of interest in activities, sleep difficulties, concentration difficulties). The GAD section allows full diagnostic assessment.

Health Conditions

We obtained information from the computerized Department of Veterans Affairs Outpatient Clinic File on

physician medical diagnoses during the year following the index visit. Diagnoses were grouped according to International Classification of Diseases—9th rev. (ICD-9-CM; World Health Organization, 1988). For medical diagnoses, this included any infectious, neoplasm, endocrine, blood, nervous system, circulatory, respiratory, gastrointestinal, genitourinary, dermatological, and musculoskeletal diagnoses. A summary variable of total number of types of diagnoses was created (range 0–11) as well as a variable indicating the presence or absence of each of the following disease categories: circulatory, dermatological, gastrointestinal, and musculoskeletal.

Health Related Quality of Life

Five physical health subscales of the RAND 36-item health survey 1.0 (Ware & Sherbourne, 1992) measured health related quality of life: physical functioning (10 items that reflect the extent to which health limits physical activities; in the present study, $\alpha = .92$), role limitations due to physical health (4 items that reflect limitations in activities in the past 4 weeks; in the present study, $\alpha = .88$), pain (2 items that measure pain interference in daily activities; in the present study, $\alpha = .89$), energy/fatigue (4 items that tap amount of time one feels full of pep, energetic, worn out, or tired; in the present study, $\alpha = .87$), and general health (4 items that rate current health, future health, and resistance to illness; in the present study, $\alpha = .89$). Scores on all scales range from 0 to 100; higher scores indicate better functioning.

Health Risk Behaviors

Questionnaire items asked about body weight and height to calculate body mass index (BMI) and smoking status (*current*, *former*, *never*; coded 2, 1, and 0, respectively). These items were adapted from the Center for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS; Thompson, Nelson, Caldwell, & Harris, 1999). Items assessing frequency and quantity of alcohol consumed on heaviest drinking days were adapted from the Health and Daily Living Form (Moos, Cronkite, & Finney, 1990).

Demographics

Questionnaires items asked about age, gender, education, ethnicity, marital status, and employment status.

Data Analysis

Hierarchical linear and logistic regressions were used to examine the relationship between PTSD (diagnosis and symptom severity) and physician diagnosed medical conditions. Covariates were entered on the first step; these included demographic and behavioral risk factors that could possibly affect health such as age, BMI, smoking status, and alcohol consumption on maximum drinking days. In the second step, PTSD was entered. To examine the health related quality of life indices, hierarchical linear regression analyses were performed using the age and health risk variables and one additional covariate, number of current medical conditions. PTSD symptom severity was negatively skewed; thus this variable was subject to a square root transformation prior to the data analyses.

To describe the association between PTSD and health status among women and men, we focus on PTSD symptom severity to avoid loss of power associated with the use of a dichotomous PTSD (i.e., diagnosis present/absent). To examine whether patient gender moderated the association between PTSD symptoms and health status, a series of hierarchical regression analyses were conducted. In these models, after entering covariates, gender and PTSD symptoms were entered, and then their interaction. If the interaction term significantly added to the overall model, then moderation occurred.

Results

Thirty-three participants (25%) met criteria for PTSD based on the CAPS (see Table 1 for the mean symptom severity score by PTSD status). For those in the sample experiencing a qualifying DSM-IV criterion A traumatic life event, the principal events were motor vehicle accident or other accident (9%), combat (12%), sudden death of loved one (18%), life threatening illness (9%), physical assault (3%), witnessed physical assault (6%), childhood physical abuse (9%), domestic violence (3%), childhood sexual abuse (24%), and adult sexual assault (6%).

Comparison of Patients With and Without PTSD on Demographic and Clinical Characteristics

Table 1 presents comparisons of patients with and without PTSD on demographic and clinical characteristics. PTSD patients were younger, more likely to be current smokers, had higher BMIs, were more likely to have a musculoskeletal diagnosis, and had poorer physical functional status on all five measures of health related quality of life.

Table 1. Comparison of Patients With and Without PTSD on Demographic and Clinical Characteristics

Variable	PTSD ($n = 33$)	Without PTSD ($n = 101$)	$t(131–132)$	$\chi^2(1, N = 133–134)$
Age, *M* (*SD*)	47.18 (10.99)	53.28 (15.88)	2.04*	
Female, % (*n*)	55 (18)	63 (64)		0.81
Married, % (*n*)	36 (12)	47 (47)		1.04
Education, % (*n*)				5.18[a]
High school or less	27 (9)	11 (11)		
Some college/college degree	58 (19)	72 (72)		
Postcollege	15 (5)	17 (17)		
Employed, % (*n*)	46 (15)	63 (64)		3.29
Ethnic minority, % (*n*)	47 (15)	33 (33)		2.01
Smokes cigarettes				14.29[a]***
Never, % (*n*)	24 (8)	53 (53)		
Past, % (*n*)	24 (8)	28 (28)		
Current, % (*n*)	52 (17)	19 (19)		
Alcohol consumption (oz), *M* (*SD*)	0.65 (1.28)	0.47 (1.44)	0.65	
Body mass index, *M* (*SD*)	31.49 (8.41)	27.55 (5.45)	−3.12**	
Circulatory, % (*n*)	58 (19)	41 (41)		2.90
Gastrointestinal, % (*n*)	42 (14)	29 (29)		2.15
Musculoskeletal, % (*n*)	73 (24)	46 (46)		7.37**
Dermatological, % (*n*)	33 (41)	41 (11)		0.55
Total no. of conditions, *M* (*SD*)	4.6 (2.57)	4.0 (2.23)	−1.35	
Physical function, *M* (*SD*)	53.79 (25.68)	78.35 (25.40)	4.80***	
Role limitations—Physical health, *M* (*SD*)	35.61 (38.54)	69.75 (39.25)	4.35***	
Pain, *M* (*SD*)	42.19 (25.48)	68.60 (28.01)	4.79***	
Energy/fatigue, *M* (*SD*)	32.88 (19.69)	57.50 (22.82)	5.55***	
General health, *M* (*SD*)	40.61 (26.42)	66.35 (22.82)	5.39**	
CIDI-SF depression *M* (*SD*)	2.39 (1.49)	0.70 (1.27)	−6.35***	
CIDI-SF GAD *M* (*SD*)	0.69 (0.36)	0.15 (0.47)	−7.00***	
CIDI- SF Panic Attacks, *M* (*SD*)	2.30 (2.43)	0.58 (1.36)	−5.08***	
PTSD symptom severity, *M* (*SD*)	75.52 (23.05)	11.24 (16.53)	14.67***	

Note. Alcohol consumption is a quantity frequency index on maximum drinking days. CIDI-SF = Composite International Diagnostic Interview—Short Form; GAD = generalized anxiety disorder; PTSD = posttramatic stress disorder.
[a] *df*s = 2.
* $p < .05$. ** $p < .01$. *** $p < .001$.

PTSD and Physician-Diagnosed Medical Conditions

To examine potential covariates, correlations between demographic and medical conditions, as well as comparisons of patients with and without PTSD on demographics, were examined. Age was positively associated with the presence of a circulatory, $r(133) = .45$, $p < .001$, gastrointestinal, $r(133) = .19$, $p < .05$, and dermatological diagnosis, $r(133) = .18$, $p < .05$, and the total number of medical conditions, $r(133) = .35$, $p < .01$, and with a PTSD diagnosis (see Table 1). Thus, age as well as BMI, smoking status, and alcohol consumption were used as covariates in the following analyses.

We examined the association of PTSD diagnosis with medical conditions (see Table 2). After controlling for covariates, PTSD diagnosis was significantly associated with the presence of a circulatory, and a musculoskeletal diagnosis. The associations between PTSD diagnosis and dermatological diagnoses and total number of conditions were not significant.

Next, we examined PTSD symptom severity and medical conditions (see Table 2). After controlling for covariates, PTSD symptom severity was significantly associated with the presence of a circulatory and a musculoskeletal disorder. In addition, PTSD symptom severity was positively associated with total number of medical conditions.

PTSD and Physical Health Related Quality of Life

To examine potential covariates, correlations between demographic and physical health related quality of life were examined. Greater age was associated with better functional status on the pain, $r(133) = .19$, $p < .05$, and energy/fatigue, $r(133) = .22$, $p < .05$, subscales, and with a PTSD diagnosis. Thus, age was used as covariates in the following analyses. Health risk variables (smoking status, alcohol consumption on maximum drinking days, and BMI) and total number of medical conditions were also included as covariates.

Table 2. Linear and Logistic Regression Analyses With PTSD Predicting Physician-Diagnosed Medical Conditions and Physical Health Related Quality of Life

Outcome	PTSD diagnosis			PTSD symptom severity		
	B (*SE*)	OR (95% CI)		*B* (*SE*)	OR (95% CI)	
Medical conditions						
Circulatory	1.29* (0.53)	3.69 (1.25–10.18)		0.21*** (0.07)	1.23 (1.07–1.41)	
Musculoskeletal	1.09* (0.49)	2.96 (1.13–7.76)		0.12* (0.06)	1.13 (1.01–1.26)	
Gastrointestinal	0.84 (0.49)			0.10 (0.06)		
Dermatological	−0.05 (1.10)			−0.00 (0.06)		
	B (*SE*)	β	ΔR^2	*B* (*SE*)	β	ΔR^2
Total number of medical conditions	0.89 (0.47)	0.16	0.02	0.16** (0.06)	0.26	0.05
Physical health related quality of life						
Physical function	−19.78** (5.66)	−0.31	0.08	−2.74*** (0.71)	−0.37	0.10
Role limitations—Physical health	−24.77** (8.64)	−0.26	0.05	−4.14*** (1.08)	−0.37	0.10
Energy/fatigue	−17.62*** (4.81)	−0.31	0.08	−2.25*** (0.94)	−0.38	0.11
Pain	−19.15** (6.17)	−0.28	0.06	−2.84** (0.78)	−0.36	0.09
General health	−18.38*** (5.11)	−0.31	0.07	−3.00 (0.63)	−0.43	0.13

Note. Analyses examining physician-diagnosed medical conditions control for age, smoking status, alcohol consumption on maximum drinking days, and BMI. Analyses examining physical health related quality of life control for age, smoking status, alcohol consumption on maximum drinking days, BMI, and total number of medical conditions.
*$p < .05$. **$p < .01$. ***$p < .001$.

PTSD diagnosis was also associated with all five quality of life subscales (see Table 2). More severe PTSD symptoms were associated with poorer physical health related quality of life on all five subscales.

PTSD, Physical Health, and Other Comorbid Conditions

Given the high overlap between PTSD and other psychopathology, we examined whether associations between PTSD and health outcomes remained when depressive symptoms, GAD, and panic symptoms were controlled. For PTSD diagnosis, the pattern of findings generally remained the same except for several physical health related quality of life subscales. The association between PTSD diagnosis and role limitations due to physical health, energy/fatigue, and pain was not significant when depressive symptoms were included as a covariate.

When PTSD symptom severity was examined, again the pattern of findings generally remained the same. One difference emerged: when depressive symptoms were controlled, the association between PTSD symptom severity and pain was not significant.

Patient Gender as a Moderator of the Association Between PTSD Symptoms and Health Status

Table 3 presents comparisons of women and men on demographic and clinical variables. Women were younger and more likely to be employed than men. Women were more likely to be nonsmokers or to have a history of smoking than men. Women were less likely to have had a circulatory condition; women had poorer physical health related quality of life on two subscales: role limitations due to physical health and general health.

Table 4 presents the main effects and interactions for the moderation analyses. After controlling for covariates and PTSD symptoms, male gender was associated with a circulatory diagnosis, whereas female gender was associated with poorer general health. Only one interaction was significant: energy/fatigue. The association between PTSD symptom severity and energy/fatigue was stronger among men ($\beta = -.62$, $p < .001$, R^2 change = .27) than among women ($\beta = -.25$, $p < .05$, R^2 change = .04). None of the other interactions were significant.

Discussion

The present study examined female and male VA medical patients with PTSD resulting from a variety of etiologic traumatic life events and their health status using both objective and self-report measures of health. Consistent with prior work, patients with a diagnosis of PTSD were more likely to have physician-diagnosed circulatory and musculoskeletal disorders than patients without PTSD. In addition, PTSD symptom severity was associated with an increased likelihood of physician-diagnosed circulatory and musculoskeletal diagnoses as well as total number of types of medical conditions. Both PTSD diagnosis and symptoms were associated with poorer health

Table 3. Comparison of Women and Men on Demographic and Clinical Characteristics

Variable	Women (n = 82)	Men (n = 52)	t(119–132)	χ^2 (1, N = 133–134)
Age, *M* (*SD*)	47.95 (14.78)	57.44 (13.44)	3.71***	
Married, % (*n*)	42 (34)	48 (25)	0.57	
Education, % (*n*)				3.45[a]
High school or less	14 (11)	17 (9)		
Some college/college degree	74 (60)	60 (31)		
Postcollege	12 (10)	23 (12)		
Employed, % (*n*)	70 (57)	42 (22)		9.73**
Ethnic minority, % (*n*)	41 (33)	29 (15)	1.74	
Smokes cigarettes, % (*n*)				19.69[a]***
Never	59 (48)	25 (13)		
Past	15 (12)	46 (24)		
Current	26 (21)	29 (15)		
Alcohol consumption (oz.), *M* (*SD*)	0.34 (0.94)	0.70 (1.90)	1.63	
Body mass index, *M* (*SD*)	28.85 (7.13)	28.03 (5.42)	−0.71	
Circulatory, % (*n*)	34 (28)	62 (32)		9.66**
Gastrointestinal, % (*n*)	28 (23)	39 (20)		1.58
Musculoskeletal, % (*n*)	51 (42)	54 (28)		0.09
Dermatological, % (*n*)	39 (32)	39 (20)		0.00
Total no. of conditions, *M* (*SD*)	4.00 (2.22)	4.40 (2.55)	0.97	
Physical function, *M* (*SD*)	74.51 (26.71)	68.75 (27.96)	−1.18	
Role limitations—Physical health, *M*(*SD*)	68.52 (38.54)	50.00 (44.28)	−2.55*	
Pain, *M* (*SD*)	62.19 (29.77)	61.83 (29.65)	−0.07	
Energy/fatigue, *M*(*SD*)	53.15 (23.72)	48.65 (25.57)	−1.03	
General health, *M*(*SD*)	65.43 (24.38)	51.44 (26.79)	−3.11**	
PTSD symptom total, *M* (*SD*)	27.63 (33.58)	30.63 (35.35)	0.46	
PTSD diagnosis, % (*n*)	22 (18)	29 (15)		0.82

Note. Alcohol consumption is a quantity frequency index on maximum drinking days.
[a] *df*s = 2.
*$p < .05$. **$p < .01$. ***$p < .001$.

related quality if life. To our knowledge, this is the first study to examine physician-diagnosed medical conditions among female medical patients with PTSD.

After controlling for demographics and health risk behaviors, PTSD diagnosis and symptoms were associated with physician-diagnosed circulatory and musculoskeletal diagnoses. Importantly, the association between PTSD and health remained significant even after controlling for comorbid depression, panic, and generalized anxiety disorder. These findings are consistent with Schnurr, Spiro

Table 4. Significant Main Effects and Interactions for PTSD Symptom Severity and Gender on Health Variables

Outcome	*B* (*SE*)		
	PTSD	Gender	PTSD × Gender
Medical conditions			
Circulatory	0.21** (0.07)	−1.08* (0.49)	−0.12 (0.13)
Musculoskeletal	0.12* (0.06)	0.08 (0.43)	0.11 (0.11)
Gastrointestinal	0.09 (0.06)	−0.39 (0.45)	−0.12 (0.11)
Dermatological	0.00 (0.06)	0.21 (0.41)	−0.01 (0.11)
Total number of medical conditions	0.17** (0.06)	0.05 (0.43)	−0.07 (0.11)
Physical health related quality of life			
Physical function	−2.69*** (0.71)	4.94 (5.06)	−0.63 (1.26)
Role limitations—Physical health	−4.00*** (1.07)	14.42 (7.58)	2.27 (1.88)
Energy/fatigue	−2.43*** (0.60)	6.37 (4.29)	1.92+ (1.06)
Pain	−2.86*** (0.78)	−1.91 (5.56)	−0.11 (1.39)
General health	−2.86*** (0.61)	15.11** (4.29)	1.49 (1.06)

Note. Analyses examining physician-diagnosed medical conditions control for age, race, gender, smoking status, alcohol consumption on maximum drinking days, and BMI. Analyses examining physical health related quality of life control for age, gender, smoking status, alcohol consumption on maximum drinking days, BMI, and total number of medical conditions.
+$p = .07$. **$p < .01$. ***$p < .001$.

et al.'s work (Schnurr, Spiro, et al., 2000) with World War II and Korean veterans, wherein a relationship was found between PTSD and onset of cardiovascular and musculoskeletal diagnoses. However, we did not find significant associations between PTSD and gastrointestinal and dermatological diagnoses. One possible explanation is that male combat veteran populations of specific eras have exposure to common environmental toxins, which explains the link between PTSD and these health conditions.

In this study, PTSD symptom severity was associated with greater number of different medical conditions, similar to findings with Vietnam combat veterans (Beckham et al., 1998). Schnurr and colleagues (Friedman & Schnurr, 1995; Schnurr & Jankowski, 1999) propose that PTSD leads to various health problems through biological, psychological, and behavioral correlates that independently and jointly combine to influence disease. Given the number and chronicity of these disease-enhancing correlates, the model suggests that PTSD may connote liability to multiple disease outcomes. Perhaps these processes explain why PTSD symptom severity was associated with more types of medical conditions.

Consistent with prior work, PTSD was associated with physical health related quality of life (Butterfield et al., 2000; Schnurr, Ford, et al., 2000; Zayfert et al., 2002). Patients with a PTSD diagnosis and more severe PTSD symptoms experienced more limitations in physical functioning and physical role. They also had less energy, more pain, and poorer general health. Thus, in addition to increases in health problems as measured by a more objective source, PTSD patients perceive a relative decrease in their physical functioning that affects various aspects of their lives. However, it is important to note that several of the findings appeared to be accounted for by comorbid depression.

In a recent empirical review, Kimerling et al. (2002) noted the lack of research on objective health status and PTSD among females. In this study, when directly compared, the relationship between PTSD and both objective and self-reported health status was generally similar for men and women. We found one difference: the association between PTSD symptom severity and energy/fatigue was stronger among men than women. Although further studies are needed, it may be that once PTSD develops, it generally has similar health effects on the biological and psychological systems of both men and women.

This study has several limitations that are important to note. These are cross-sectional data and causality cannot be inferred. It is unknown whether PTSD preceded the health conditions or vice versa. Selection biases may have occurred; for example, individuals with PTSD and physical health problems may be more likely to seek care than persons with PTSD alone thus creating the illusion that PTSD is associated with physical health problems. Longitudinal studies of PTSD and health are needed. The sample size was small with relatively low power to detect significant relationships, especially for logistic regression and the analysis of gender differences. More research is needed using larger samples of male and female medical patients. We also used broad disease categories rather than specific conditions (e.g., irritable bowel syndrome), which may have obscured significant associations. Thus, more research is needed on specific conditions. Lastly, patients were not surveyed about their use of non-VA health care.

Despite these limitations, these preliminary data provide evidence that the association between PTSD and health status extends to male and female VA patients in a general medical setting. Notable strengths of this study include the use of an objective measure of health status (i.e., physician-diagnosed illness), thus reducing bias from patient self-report due to potential symptom exaggeration. In addition, using direct assessments of PTSD, rather than those assigned by physicians and providers in the medical clinics also eliminates potential bias (i.e., physician bias to see more medical conditions in PTSD patients). Lastly, these data suggest that men and women with PTSD may have different medical condition correlates, although when directly compared, they are generally similar in terms of health status. More research is needed to address gender, PTSD, and health utilizing samples of both veteran and civilian individuals with PTSD resulting from various etiological traumas. Future work may also want to include an analysis of PTSD related to specific traumas (e.g., rape-related PTSD), as different traumatic life events may be associated with different physical symptoms.

These data imply that primary care and medical clinicians should be aware that patients with PTSD may have more medical morbidity and poorer physical health related quality of life. These providers may wish to consider how trauma-related stress influences both the course of illness and treatment adherence. For example, treatment of PTSD may reduce health problems. Lastly, these data reinforce the importance of recent research efforts to identify effective brief PTSD screening tools for use in primary care settings (e.g., Prins et al., 2003).

Acknowledgments

A Department of Veterans Affairs VISN 21 Young Investigator Award to the first author supported this work. We thank the following people for their help with data

collection: Patrick Nisco, Poorni Otilingam, Jill Andrassy, Lois Sharp, and Casey Saltzman. Daniela Hugelshofer provided comments on this paper.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Andreski, P., Chilcoat, H., & Breslau, N. (1998). Post-traumatic stress disorder and somatization symptoms: A prospective study. *Psychiatry Research, 79,* 131–138.

Beckham, J. C., Moore, S. D., Feldman, M. E., Hertzberg, M. A., Kirby, A. C., & Fairbank, J. A. (1998). Health status, somatization, and severity of posttraumatic stress disorder in Vietnam combat veterans with posttraumatic stress disorder. *American Journal of Psychiatry, 155,* 1565–1569.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., et al. (1995). The development of the clinician-administered PTSD scale. *Journal of Traumatic Stress, 8,* 75–90.

Boscarino, J. A., & Chang, J. (1999). Electrocardiogram abnormalities among men with stress-related psychiatric disorders: Implications for coronary heart disease and clinical research. *Psychosomatic Medicine, 59,* 605–614.

Breslau, N., & Davis, G. C. (1992). Posttraumatic stress disorder in an urban population of young adults: Risk factors for chronicity. *American Journal of Psychiatry, 149,* 671–675.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The 1996 Detroit area survey of trauma. *Archives of General Psychiatry, 55,* 626–632.

Butterfield, M. I., Forneris, C. A., Feldman, M. E., & Beckham, J. C. (2000). Hostility and functional health status in women veteran with and without posttraumatic stress disorder: A preliminary study. *Journal of Traumatic Stress, 13,* 735–741.

Centers for Disease Control and Prevention. (1999). Mortality patterns—United States, 1997. *Morbidity and Mortality Weekly Report, 48,* 664–668.

Friedman, M. J., & Schnurr, P. P. (1995). The relationship between trauma, PTSD, and physical health. In M. J. Friedman, D. S. Charney, & A. Y. Deutch (Eds.), *Neurobiological and clinical consequences to stress: From normal adaptation to PTSD* (pp. 507–524). New York: Lippincott-Raven.

Kessler, R. C., Andrews, G., Mroczek, D., Ustun, B., & Wittchen, H. (1994). The World Health Organization Composite International Diagnostic Interview Short Form (CIDI-SF). *International Journal of Methods in Psychiatric Research, 7,* 171–185.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52,* 1048–1060.

Kimerling, R., Clum, G., McQuery, J., & Schnurr, P. P. (2002). PTSD and medical comorbidity. In R. Kimerling, P. Ouimette, & J. Wolfe (Eds.), *Gender and PTSD* (pp. 271–302). New York: Guilford.

Moos, R. H., Cronkite, R. C., & Finney, J. W. (1990). *Health and Daily Living Form manual* (2nd ed.). Palo Alto, CA: Mind Garden.

Prins, A., Ouimette, P., Kimerling, R., Cameron, R., Hugelshofer, D., Shaw-Hegwar, J., et al. (2003). The Primary Care PTSD Screen (PC-PTSD): Development and operating characteristics. *Primary Care Psychiatry.*

Sampson, A. Y., Bensen, S., Beck, A., Price, D., & Nimmer, C. (1999). Posttraumatic stress disorder in primary care. *Journal of Family Practice, 48,* 222–227.

Schnurr, P. P., Ford, J. D., Friedman, M. J., Green, B. L., Dain, B. J., & Sengupta, A. (2000). Predictors and outcomes of posttraumatic stress disorder in World War II veterans exposed to mustard gas. *Journal of Consulting and Clinical Psychology, 68,* 258–268.

Schnurr, P. P., Friedman, M. J., & Green, B. L. (1996). Post-traumatic stress disorder among World War II mustard gas test participants. *Military Medicine, 161,* 131–136.

Schnurr, P. P., & Jankowski, M. K. (1999). Physical health and posttraumatic stress disorder: Review and synthesis. *Seminal Clinical Neuropsychiatry, 4,* 295–304.

Schnurr, P. P., & Spiro, A. (1999). Combat exposure, PTSD, and health behaviors as predictors of self-reported physical health in older military veterans. *Journal of Nervous and Mental Disease, 187,* 353–359.

Schnurr, P. P., Spiro, A., & Paris, A. H. (2000). Physician-diagnosed medical disorders in relation to PTSD symptoms in older military veterans. *Health Psychology, 19,* 91–97.

Shalev, A., Bleich, A., & Ursano, R. J. (1990). Posttraumatic stress disorder: Somatic comorbidity and effort tolerance. *Psychosomatics, 31,* 197–203.

Stein, M. B., McQuaid, J. R., Pedrelli, P., Lenox, R., & McCahill, M. E. (2000). Posttraumatic stress disorder in the primary care medical setting. *General Hospital Psychiatry, 22,* 261–269.

Taft, C. T., Stern, A. S., King, L. A., & King, D. W. (1999). Modeling physical health and functional health status: The role of combat exposure, posttraumatic stress disorder, and personal resource attributes. *Journal of Traumatic Stress, 12,* 3–23.

Thompson, B. L., Nelson, D. E., Caldwell, B., & Harris, J. R. (1999). Assessment of health risk behaviors. A tool to inform consumers, providers, health care organizations, and purchasers. *American Journal of Preventive Medicine, 16,* 48–59.

Verbrugge, L. M. (1985). Gender and health: An update on hypotheses and evidence. *Journal of Health and Social Behavior, 26,* 156–182.

Verbrugge, L. M. (1989). The twain meet: Empirical explanations of sex differences in health and mortality. *Journal of Health and Social Behavior, 30,* 282–304.

Wagner, A. W., Wolfe, J., Rotnitsky, A., Proctor, S. P., & Erickson, D. J. (2000). An investigation of the impact of posttraumatic stress disorder on physical health. *Journal of Traumatic Stress, 13,* 41–55.

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30,* 473–483.

Weathers, F. W., Keane, T. M., & Davidson, J. R. T. (2001). Clinician-Administered PTSD Scale: A review of the first ten years of research. *Depression and Anxiety, 13,* 132–156.

Wolfe, J., Schnurr, P. P., Brown, P. J., & Furey, J. (1994). Posttraumatic stress disorder and war-zone exposure as correlates of perceived health in female Vietnam War veterans. *Journal of Counseling and Clinical Psychology, 62,* 1235–1240.

World Health Organization. (1988). *International classification of diseases—Clinical modification* (9th rev., 4th ed.). Ann Arbor, MI: Commission on Professional and Hospital Activities.

Zatzick, D. F., Marmar, C. R., Weiss, D. S., Browner, W. S., Metzler, T. J., Golding, J. M., et al. (1997). Posttraumatic stress disorder and functioning and quality of life outcomes in a nationally representative sample of male Vietnam veterans. *American Journal of Psychiatry, 154,* 1690–1695.

Zatzick, D. F., Weiss, D. S., Marmar, C. R., Metzler, T. J., Wells, K., Golding, J. M., et al. (1997). Posttraumatic stress disorder and functioning and quality of life outcomes in female Vietnam veterans. *Military Medicine, 162,* 661–665.

Zayfert, C., Dums, A. R., Ferguson, R. J., & Hegel, M. T. (2002). Health functioning impairments associated with posttraumatic stress disorder, anxiety disorders, and depression. *Journal of Nervous and Mental Disease, 190,* 233–240.